

From GRB to CityGRB: Old wine in a new interoperable bag

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GRB points to a reference database encompassing the output of a continuous and ongoing (re-)inventory of the topography of the region of Flanders in Belgium at high spatial resolution. It is the acronym for the Dutch language term “Grootschalig ReferentieBestand”. GRB is limited to the planimetric dimensions. The data model underpinning the GRB has been established at the inception of the project in the late 1990ies and –inevitably- has evolved and probably will continue to evolve along the project’s lifetime. The GRB-data model is to some extent vernacular. It materializes decisions and preferences about terminology, entity classes, geometries, relationships, attributes, attribute value ranges and domains, without explicit reference to similar projects nor to data models accepted as international standards (De Cubber et al., 2009; De Cubber and Van Orshoven, 2011). Whereas the GRB is a valid answer to address the topographic data requirements within Flanders, it lacks interoperability with similar topographic databases in the neighbouring regions and countries.

CityGML is a data model accepted as an international standard for urban topography. In contrast to GRB, CityGML makes provision for the third dimension and for five levels of detail (LoD-0 to LoD-4) (Kolbe et al., 2005). We tested the applicability of CityGML (version 2.0.0) as a reference data model according to which GRB could be re-modelled in order to improve GRB’s interoperability with other (possibly re-modelled as well) high resolution topographic databases. We found that remodelling of the 2D-GRB is possible to a large extent, resulting in a 2D-CityGRB-data model. We also identified incompatibilities of the omission and commission types. GRB contains object classes and attributes which cannot be accommodated by CityGML and vice versa. To address the former, a CityGML Application Domain Extension (ADE) is a solution while external, non-GRB-data sources are required to populate CityGML-classes not present in GRB.

We also designed a 3D-CityGRB data model and tested its implementation for the classes ‘building’ and ‘building part’ with different clouds of elevation and surface data. We found that with a high density point dataset from airborne LiDaR, LoD-2, characterised by realistic shapes of building roofs, can be achieved.

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